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# Problems of the Water Content in Shallow Water Sediments

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Investigations into the extent and rate of compaction of marine sediments and, hence, problems of porosity may be made from the water content of Recent core material. The few examples given below are intended to show that many problems are still unsolved.

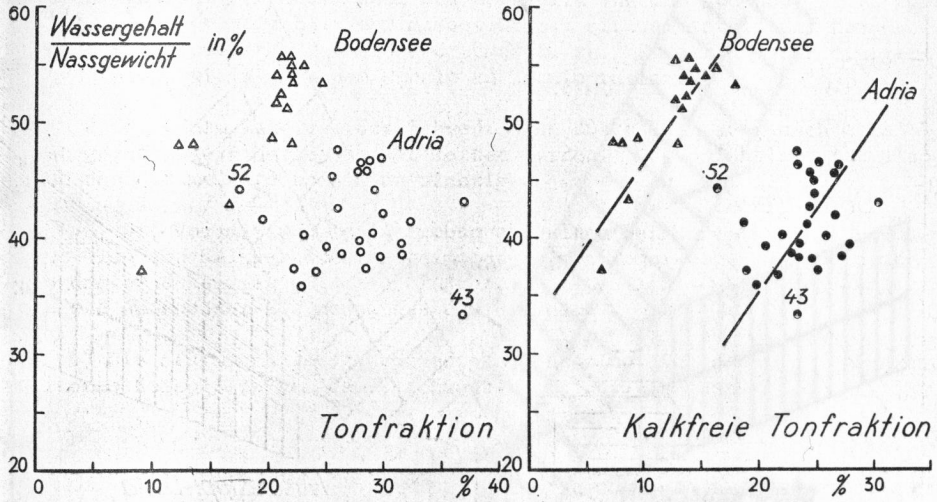


Fig. 1. Water and clay content in cores from the Adriatic and Lake Constance. Abscissa: Water content, % of wet-weight. Ordinate: Clay fraction (%) (grain size <2 micra) (right-hand curve, data after deduction of carbonate). Trend lines are roughly drawn.

1) Grain size. As is well known, the water content will generally rise as the size of grains decreases. In the finest fractions the grain size gains an ever-increasing significance. The most important part is played by the finely divided organic substance. If the quantities of the latter may be neglected, the water content will normally rise fairly proportionately to the content of clay minerals, but not generally with the content of grains having a diameter of less than 2 micra (Fig. 1). This can be shown in cores from the Adriatic and Lake Constance, both nearly identical as to carbonate content, components, etc. However, even this obvious relationship between clay minerals and water content does not always seem to be true. An example in contrast to these is a core collected at the west coast of Sweden. Here packing is influential.

2) Salinity of the water. Samples from fresh water (Lake Constance) contain appreciably more water than completely marine sediments from the Adriatic (Fig. 1). An example in which the coarser grains were also

taken into consideration shows the same picture: samples with approximately 36% sand, 40% silt, and 24% clay ( = 18% carbonate-free clay) from the Adriatic contain 38% water, referred to the wet-weight while the corresponding figure for Lake Constance is 54%. I ascribe this to differences in salinity and, accordingly, to effects of flocculation, although experiments (L. Bjerrum and I. Th. Rosenquist, 1956) have led to contrary conclusions. In the latter the water content of artificially sedimented clays in fresh water was approximately 8% lower than that of clays from salt water.

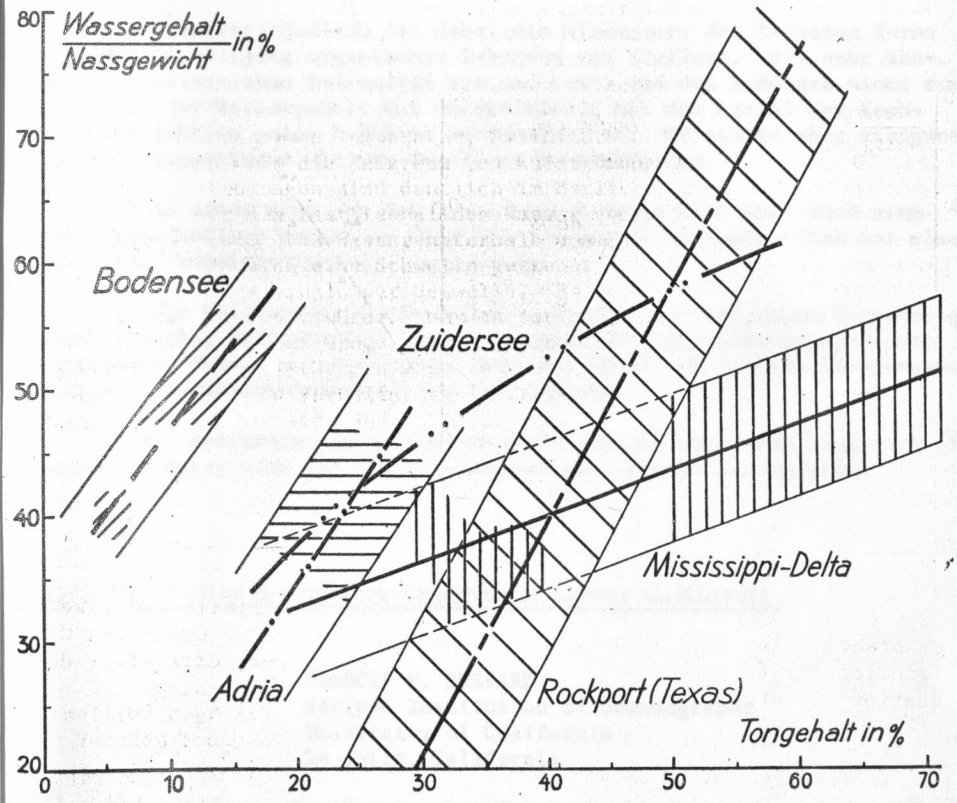


Fig. 2. Water and clay content. Abscissa: Water content (% of wet-weight) Ordinate: Clay content (%). Lake Constance: fresh water, organic carbon 0.46%, "clay" decalcified, ⟨2 micra. Adriatic: Salinity 35°/oo, av. organic carbon 0.25%, "clay" - decalcified, ⟨2 micra. Zuiderzee: Brackish water. Organic substance considered "Clay" = non-decalcified, ⟨2 micra (A. I. Wiggers & H. Smits). Mississippi delta and Rockport: Salinity 20 ± °/oo, "Clay" = non-decalcified ⟨4 micra (F. P. Shepard & D. G. Moore)

3) Rate of sedimentation. A comparison of the first two examples with sediment samples from other investigations reveals some deviations (Fig. 2). While the trend of the values from Lake Constance, from the Adriatic, and from the Texas coast shows a fairly satisfactory agreement, it differs from those of the Zuiderzee and, in particular, of the Mississippi delta. Presumably, the rate of sedimentation in various surroundings also plays a part in this connection.

## Probleme des Wassergehalts in Flachwasser-Sedimenten

EUGEN SEIBOLD

Der kurze Beitrag soll mit wenigen Beispielen zeigen, wie viele hierhergehörige Fragen noch offen sind und soll deshalb zu ähnlichen Untersuchungen anregen.

Der Wassergehalt feinkörniger rezenter Sedimente nimmt bekanntlich im allgemeinen mit abnehmender Korngrösse zu.

1) Sebstverständlich ist dabei die Mineralart des feinsten Korns und die Beteiligung organischer Substanz von Einfluss. Bei sehr ähnlichen, kalkreichen Sedimenten aus der Adria und dem Bodensee nimmt zum Beispiel der Wassergehalt nur unregelmässig mit dem Anteil der Korngrössenfraktion unter 2 Mikron Durchmesser zu. Er steigt aber einigermassen proportional mit dem Gehalt an Tonmineralien.

2) An einem Kern von der Schwedischen Küste kann aber auch eine fast gegenteilige Beziehung abgeleitet werden. Offensichtlich ist also auch das Sedimentations-Milieu wichtig.

3) Die Vollmarinen Adria-Proben enthalten bei ähnlichen Korngrössen-Verteilungen, Kalkgehalten, Beteiligungen von Tonmineralien und untergeordnetem Gehalt an organischer Substanz erheblich weniger Porenwasser als die Süsswasser-Sedimente aus dem Bodensee.

4) Die Sedimentationsgeschwindigkeit scheint sich nach Vergleich mit weiteren Beispielen aus dem Flachwasser gleichfalls auszuwirken.

## Granite-Walled Submarine Canyons of Lower California

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The southern tip of Lower California is bordered by a series of submarine canyons. These were investigated in March 1959, by approximately 500 sea-miles of sounding lines using a Precision Depth Recorder and a new type radar for position. These soundings supplement several hundred miles of sounding lines run in 1940 and in 1957. The canyons were traced from the coast out to their termination in an irregularly surfaced fan at about 1300 fathoms. The entire slope out to this depth is cut into an irregular pattern of winding canyons with numerous tributaries and separated by narrow ridges. The outward slope of the valley floors appears to be continuous. At Cape San Lucas the heads of some of the canyons rise above sea level as stacks.

The walls of the canyons consist of granite and other intrusive rocks along with some conglomerate containing wood fragments and vertebrate fossils. Photographs by Carl Shipek show the irregularity of the